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ABSTRACT

This study of self-reinforcement in children's learning looks at two key variables in the self-reinforcement process: the type of reward available and the level of achievement requisite for reward. The study was conducted to clarify the relative efficacy of self-dispensed verbal and tangible rewards for learning. The study also attempted to replicate previous findings regarding the effects of different minimum performance standards on learning rate. The performance of 69 preschool children (aged 4 1/2-5 1/2) on a discrimination learning task had to meet one of three standards to deserve a reward: chance level, 100% correct, or continued improvement. Self-dispensed rewards were either praise or tokens exchanged for small prizes. A control group learned the task sans standard or reward. Children learned faster when they rewarded themselves with tokens than with praise. Results reflect a developmental view of reinforcer effectiveness. Previous findings regarding performance standards were not replicated. The internal standards of many children superseded the experimenter-set standards for performance. (Author/RH)

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Effects of Achievement Standards and Self-Rewards on Children's Task Mastery

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Abstract

There has been scant research on how learning may be affected by two key variables in the self-reinforcement process: the type of reward available and the level of achievement requisite for reward. This study was conducted to clarify the relative efficacy of self-dispensed verbal and tangible rewards for learning. The study also attempted to replicate previous findings regarding the effects of different minimum performance standards on learning rate. Preschool children's performance on a discrimination learning task had to meet one of three standards to deserve a reward: chance level, 100% correct, or continued improvement. Self-dispensed rewards were either praise or tokens exchanged for small prizes. A control group learned the task sans standard or reward. Children learned faster when they rewarded themselves with tokens than with praise. Results reflect a developmental view of reinforcer effectiveness. Previous findings regarding performance standards were not replicated. For many children, their internal standards superseded the experimenter-set standards for performance.

Effects of Achievement Standards and Self-Reward on Children's Task Mastery

There is now a considerable body of evidence that self-dispensed rewards are at least as effective in controlling behavior as are externally-dispensed rewards (Bandura & Perloff, 1967; Bolstad & Johnson, 1972; Glynn, 1970; Johnson, 1970; and Lovitt & Curtiss, 1969). Despite the popularity of self-control strategies in clinical and educational settings, however, there has been little research on the processes and parameters of self-reward techniques.

In particular, there has been minimal attention to the role that achievement standards play in self-reward techniques. "Achievement standard" may be defined as the level of performance which the individual must attain in order to reward himself. Conventional wisdom suggests that high standards are desirable, yet there is little research evidence beyond some work in external-reward situations (Locke, 1966) that higher standards lead to higher achievement. An exception is the two recent experiments by Masters, Furman & Barden (1977), which investigated the effects of four different levels of achievement standards on preschool children's learning. The children were asked to learn to discriminate the "correct" figure among

three colored geometric shapes printed on a card. Twelve different cards were presented to the children nine times, and the children's correct answers for each of the nine trial blocks were recorded.

In the two Masters et al. experiments, one-fourth of the children were assigned to each of the following treatment groups: Low Achievement Standard, Medium Standard, High Standard, and Accelerating Standard. Children in the Low group were required to answer at least 4 cards correctly out of 12 to earn a reward for that trial block. The Medium group had to answer at least 8 cards correctly; the High group had to answer all 12 cards correctly; and the Accelerating group had to improve over previous trial block performances to earn a reward.

The important differences between the two Masters et al. experiments involve the procedure for dispensing rewards for successful trial block performances. In the first experiment, the experimenter gave the children tokens, which later were exchanged for prizes, as rewards for attaining the standard of achievement that had been set by the experimenter. In the second experiment, children were told to praise their own trial block performances which met the experimenter-set standard and to criticize their own failures.

The effects of achievement standards on performance were somewhat different in the two experiments. In the externally-dispensed material reward experiment, children in the High and Accelerating groups learned faster than those in the Medium group, who in turn learned faster than those in the Low group. In the second experiment, in which self-evaluation served as reinforcement, the same effects of standards on performance was noted half-way through the task. But by the end of the nine trial blocks, nearly all of the children had mastered the task, so there was no significant difference between the treatment groups by the end of the task.

A particularly interesting finding in the Masters et al. work was that learning seemed to be considerable more rapid under verbal self-reward than under material external-reward. This result is somewhat surprising since it contradicts a common developmental view of reinforcer effectiveness, in which material rewards are usually considered very strong reinforcers for preschool children (Schultz & Sherman, 1976).

One explanation of the Masters et al. data is that their work confounded two significant variables: who dispensed the rewards (self- versus external-) and the type of reward given (verbal versus material) It is conceivable that an interaction of these two variables caused the surprising pattern of

results. Perhaps verbal rewards are more powerful than tangible rewards when both are self-dispensed, but less powerful when both are externally-dispensed. At present there has been no investigation of this possibility or even of the relative merits of different types of self-dispensed rewards alone.

A second explanation for the data derives from the work of Liebert, Spiegler & Hall (1970), in which children's performance was better when they were allowed to preview the prizes represented by their tokens than when no preview was allowed. This result suggests that the Masters et al. procedure, which did not allow children in the material reward experiment to preview the prizes, detracted from the potential effect of the tokens.

The purpose of the present experiment was twofold: (1) to attempt to replicate the Masters et al. results regarding the effects of achievement standards on learning and (2) to investigate the relative efficacy of verbal and material self-rewards.

To accomplish this purpose, the Masters et al. procedure and task were replicated as carefully as possible with some methodological improvements. First, to avoid confounding the two variables (dispenser of rewards and type of reward), this experiment examined only self-administered rewards. Second, a factorial design was used to examine the possibility of a

standard-by-reward interaction. Third, a control group was used to establish the baseline level of learning that would occur without any standards imposed by the experimenter and without any rewards given for successful trial block performance. Fourth, children were allowed to see the material rewards that their tokens represented so that they were aware of the value of the rewards prior to the task. Fifth, children in the verbal reward condition were not instructed to criticize their failures. This revision is congruent with current educational applications of self-evaluation. Furthermore, the results of a study on self-criticism by Masters & Santrock (1976) and one on self-punishment by Mahoney, Moura & Wade (1973) suggest that self-criticism or self-punishment does not enhance the effect of self-reward alone.

Method

Subjects

The subjects were 69 children ranging in age from 4½ to 5½ years. They were drawn from four nursery schools serving middle class families in a large metropolitan area. Due to the nature of the task, colorblind children were not included as subjects. The children were randomly assigned to seven treatment groups.

Learning Task

The learning task consisted of three three-choice color discrimination problems involving differently colored triangles, squares, and circles. The three stimuli for a problem were presented horizontally on grey 4 x 10 inch (.13 x .25m) cards. The task was to learn which colored shape on each card was "it." In each trial block, the first discrimination problem was presented on trials 1, 4, 7 and 10; the second problem on trials 2, 5, 8, and 11; and the third on trials 3, 6, 9 and 12. The relative positions of the three stimuli were different on each of the four presentations of a discrimination problem. The 12 cards were presented in a constant order for nine trial blocks. After extensive pilot testing, Masters et al. determined this to be the optimal number of trial blocks for assessing mastery of this task.

The child's cummulative performance during a trial block was displayed on a 4 x 30 inch (.13 x .76m) wooden tower on which twelve lights were vertically arranged. Each time the child made a correct discrimination, a light was illuminated. A movable red marker was positioned on the lightboard to indicate the performance standard in effect for the child, so that when the standard was achieved the lights were illuminated up to the marker.

Experimental Conditions

A 3 x 2 factorial design was used to investigate the effects of achievement standards (Low, High, and Accelerating) and type of reward (Praise and Tokens exchanged for prizes) on mastery of a discrimination learning task. These two fixed factors were crossed to form six experimental conditions. A seventh group, which performed the task without achievement standard or reward for trial block performance, served as a control group.

Achievement standards. An achievement standard was the number of correct discriminations required to earn a reward for a trial block. In the Low Standard condition, children were told they should achieve at least 4 correct answers out of the possible 12 in order to reward themselves for their performance on a trial block. This standard was indicated on the lightboard by a red marker placed above the fourth light. In the High Standard condition, children were told they should answer all 12 problems in a trial block correctly to reward themselves. The red marker was placed above the top light for this condition. To earn a reward in the Accelerating Standard condition, the children were to attain one more correct answer on a given block of trials than their highest score for any previous trial block. All children in the Accelerating condition began the task with the standard set at 4 correct answers. When a

child in this group attained or surpassed 4 correct answers in a trial block, the marker was raised for the next trial block to one light higher than the child's highest attained score. When the child attained that new standard, the marker was again moved one light higher than the highest attained score. Whenever a child in the Accelerating Standard condition failed to achieve a standard, the marker was left unchanged.

Rewards. The children in the Token condition were instructed to give themselves a token after each trial block in which they met or surpassed the achievement standard set for them. The tokens, red poker chips, were exchanged after the end of the experiment for small prizes, such as balloons, pencils, and tiny super balls. The children were allowed to briefly see a selection of prizes before they began the task so that they knew what the tokens represented. Children in the Praise condition were instructed to praise themselves aloud with a comment such as, "I did a really good job!" after successful trial blocks. Unlike the Masters et al. experiment, children were not instructed to criticize themselves for failing to attain the standard.

General Procedure

In a one-to-one setting, the experimenter showed each child the discrimination stimuli and the lightboard. Children

were told that they were to try to figure out which colored shape on a card was "it." After each response the experimenter would tell them whether their answer was correct or not. In addition, each correct discrimination would result in the illumination of a light. This feedback was given to all children. At the end of a trial block the children were supposed to check the lights to see how well they had done. The achievement standard set for them was carefully explained using the lightboard. They were told that if they met or surpassed the standard, they were to reward themselves for doing so well.

The experimenter and child sat at a small table so that the child could see the card held by the experimenter and the lightboard, yet the experimenter's view of the lights was blocked by a screen. This arrangement was used by Masters et al. to minimize the socially reinforcing influence of the experimenter's presence at the time the children were to reinforce themselves.

Children in the Token groups were shown some of the prizes for which the tokens could later be exchanged. They were told that the more tokens they earned, the better a prize they could choose.

Children in the Praise groups heard the experimenter model the self-praise statement, "I did a really good job!" three times during their instructions.

During the learning task, the cards were presented at approximately 10 second intervals. After correct answers the experimenter said, "That's right; that's the correct answer on that card," and turned on a light on a hidden control switch. After incorrect answers, the experimenter said simply, "No," and went on to the next card.

After each of the first few trial blocks, the experimenter encouraged the children to determine their level of performance and to reward themselves appropriately. The experimenter covered her eyes and ears after trial blocks so that the children could reward themselves privately. During informal questioning children reported that they believed the experimenter did not know their level of achievement.

A session was terminated when a child either made 12 correct discriminations in two consecutive trial blocks or completed nine trial blocks at any level of performance. The number of tokens amassed by children in the Token condition was recorded for redemption after the end of the experiment. Children were then thanked for participating and asked not to divulge the details of the game to other children until all had

had an opportunity to participate. Informal questioning of children prior to the task revealed they had not been told about it by previous subjects.

Results

Performance Scores

The primary dependent variable was the number of correct discriminations made during the nine trial blocks. Each treatment group's average performance scores for the nine trial blocks are depicted in Figure 1.

Insert Figure 1 about here

To examine the differences in the learning curves of the seven treatment groups, the nine mean trial block scores for each group were analyzed for trends. Several planned contrasts among groups represented the hypotheses of interest: a contrast for general treatment versus control, a contrast for type of reward, two contrasts for level of achievement standard, and two contrasts for the interaction of standards with rewards. The overall multivariate tests failed to reach the $p < .05$ significance level for all of these contrasts. However, the Token versus Praise reward contrast was sufficiently interesting that

univariate analysis of variance tests were used to investigate the portions of the performance scores of the Token groups and Praise groups that were due to the mean component (i.e., the average amount learned), the linear component (the rate of learning), and the quadratic through eighth degree components.

Several low-order trends were significant. The significant F ratio for the mean component, $F(df\ 1, 62) = 6.3153$, $p < .015$, indicates that the children who rewarded themselves with tokens achieved significantly different average scores from children who rewarded themselves with praise. The significant F ratio for the linear trend, $F(df\ 1, 62) = 5.2375$, $p < .026$, indicates that the children in the Token groups learned at a significantly different rate from those in the Praise groups. Table 1 presents the mean and linear component scores for all groups. All the Token groups' scores are

Insert Table 1 here

higher than those of the Praise groups. Hence, children who rewarded themselves with tokens had higher average performance scores and learned at a faster rate than children who praised themselves.

All of the above analyses were conducted using data collected from the entire sample of 69 children. Masters et al (1977), however, included in their analyses only data from children who "showed evidence of learning." They did not describe the operational definition of this criterion in the article, but one of the authors said they had excluded subjects who tended to score at a chance level throughout most of the task (Barden, Note 1). To determine whether some comparable manipulation of the present data would yield results closer to that of the Masters et al. work, the raw data from this experiment were examined and 14 children were identified whose performance remained approximately at the chance level (four correct answers per trial block) throughout the nine trial blocks. Trial block scores for these individuals tended to fall within a range of two to five correct and showed no upswing towards the end of the task.

The Token versus Praise contrast was examined with the data from the remaining 55 "learners." None of the univariate tests yielded significant F statistics for the mean, linear or higher order components for this contrast. This result is not really surprising since "non learners" occurred in somewhat disproportionate numbers in the treatment groups. There were 8 "non learners" out of 29 children in the Praise groups but

only 3 out of 31 in the Token groups. Since children were randomly assigned to groups, this result suggests that the treatments themselves had some differential effect on learning, although a Chi Square analysis of the frequencies failed to reach the $p < .05$ level of significance.

Amount of Reward Earned

Another question of interest was whether the treatment groups differed in the amount of rewards they earned. Masters et al. found no relation between treatment group and amount of contingent reinforcement. However, it seems logical to expect that the total amount of reward earned should be related to the achievement standards, since the lower the standard, the easier it would be to earn the reward.

The total amount of reward earned was subjected to a one-way analysis of variance. As expected, the six treatment groups differed significantly in the amount of reward they earned, $F(df\ 5,\ 54) = 36.89$, $p < .001$. Orthogonal contrasts revealed that the Token groups earned more rewards than did the Praise groups, $t(54) = -2.299$, $p < .025$; the Low Standard group earned more rewards than the Accelerating and High Standard groups, $t(54) = -12.026$, $p < .001$; and the Accelerating Standard

group earned more than the High Standard group, $t(54) = -4.848$, $p < .001$. There was no significant interaction of the two independent variables.

Amount of Reward Received

Since the children in this study were allowed to control their own rewards, and it was observed that some children did in fact dispense more or less than the number of rewards they had earned, the amount of reward that children actually administered to themselves was also analyzed. To determine whether the treatment groups differed in the amount of reward they gave themselves, one-way analysis of covariance was performed on the total performance scores using reward earned as the covariate.

The adjusted treatment effect on Reward Taken was not significant. Hence, the treatment groups did not differ in the amount of reward they gave themselves beyond the effect due to the amount of reward they had earned.

Discussion

The results of the present study failed to replicate the findings of Masters et al. (1977). First, planned contrasts of trends revealed that preschool children who rewarded themselves with tokens exchanged for prizes learned at a more rapid rate

than did children who praised themselves, whereas the opposite effect was reported by Masters et al. Second, this study failed to find any effect of achievement standards on learning as had Masters et al. Third, contrary to implications of the Masters et al. work, no interaction of rewards and standards was found. Finally, learning in the present experiment was related to the amount of contingent reward, whereas these two variables were not related in the previous work. These discrepancies in results occurred despite careful attempts to replicate the previously used task and procedures with subjects of comparable age, sex, general socioeconomic level, metropolitan residency, and nursery school attendance.

Perhaps the most interesting finding of the present study was that children who rewarded themselves with tokens exchangeable for prizes learned faster than those who praised themselves for success. Although this is contrary to the Masters et al. results, it is consonant with a common developmental view of reinforcer effectiveness, in which material rewards are considered potent reinforcers for preschool age children (Schultz & Sherman, 1976). Furthermore, the results of this study contribute evidence towards extending the developmental view of reinforcer effectiveness with preschool age children to include self-dispensed rewards as well as external ones.

A factor which may partially explain the contradictory results of the two studies regarding the efficacy of tokens and praise is that children in the present experiment were allowed to see the prizes before starting the task, whereas the children in the Masters study were not. Research by Liebert et al (1970), as well as the present findings, suggests that the Masters procedure detracted from the potential effect of the tokens by not permitting assessment of their value prior to the task. This finding is particularly relevant to the effective employment of self-control techniques with tangible rewards in clinical and educational settings.

It should be noted that when "nonlearners" were omitted from the data analysis in this study, as had been done in the Masters et al. work, no significant difference was found between the effects of material rewards and praise on performance. It appears probable that learning was a function of the treatment. Hence, when Masters et al. omitted nonlearners' data they may have obscured some of the treatment effects.

Another interesting finding of the present study was the apparent lack of effect of achievement standards on performance. Since Masters et al. found this effect to be significant only with external material rewards, it is possible that when control of the rewards is given to the children, as in the present

study, many of the children also assume control of the achievement standards. In fact, followup interviews in the present study revealed that many of the children did not passively accept the standards set for them by the experimenter. Rather, they seemed to substitute their own standards for success. Most of the children claimed they were actually attempting to reach a goal higher than the experimenter-set standard. Their primary incentives were the desires to master the task and to illuminate many lights on the lightboard. A few children reported that their own goals had been lower than the externally-set standard. According to the interviews, their lower goals seemed to reflect relatively low estimates of their capabilities. Why some children readily accept external standards but others adhere to their own internal standards despite external attempts to manipulate their efforts is an interesting question within the larger field of research on variables that affect patterns of self-reward behavior (Bandura & Whalen, 1966; Switzky & Haywood, 1974; Thelen & Fryrear, 1971).

In conclusion, it appears that the data of the present study indicated that preschool children's task mastery was more rapid when the self-dispensed rewards were tangible rather than verbal. These data failed to replicate the findings of

Masters et al. (1977). The greater efficacy of tangible self-reinforcement to praise in this experiment may be due to the developmental level of the children and to the potency of tokens when prizes are previewed prior to the task. The lack of effect of achievement standards on learning appeared to reflect the fact that many children pursued their own goals rather than those proposed by the experimenter.

Reference Note

1. Barden, R. C. Personal communication, May 28, 1977.

References

Bandura, A., & Perloff, B. Relative efficacy of self-monitored and externally imposed reinforcement systems. Journal of Personality and Social Psychology, 1967, 7, 111-116.

Bandura, A., & Whalen, C. K. The influence of antecedent reinforcement and divergent modeling cues on patterns of self-reward. Journal of Personality and Social Psychology, 1966, 3, 373-382.

Bolstad, O. D., & Johnson, S. M. Self-regulation in the modification of disruptive classroom behavior. Journal of Applied Behavior Analysis, 1972, 5, 443-454.

Glynn, E. L. Classroom applications of self-determined reinforcement. Journal of Applied Behavior Analysis, 1970, 3, 123-132.

Johnson, S. M. Self-reinforcement versus external reinforcement in behavior modification with children. Developmental Psychology, 1970, 3, 148-149.

Liebert, R. M., Spiegler, M. D., & Hall, W. M. Effects of the value of contingent self-administered and noncontingent externally imposed reward on children's behavioral productivity. Psychonomic Science, 1970, 18, 245-246.

Locke, E. A. The relationship of intentions to level of performance. Journal of Applied Psychology, 1966, 50, 60-66.

Lovitt, T. C., & Curtiss, K. Academic response rate as a function of teacher- and self-imposed contingencies. Journal of Applied Behavior Analysis, 1969, 2, 49-53.

Mahoney, M. J., Moura, N. G., & Wade, T. C. The relative efficacy of self-reward, self-punishment and self-monitoring techniques for weight loss. Journal of Consulting and Clinical Psychology, 1973, 40, 404-407.

Masters, J.C., Furman, W., & Barden, R. C. Effects of achievement standards, tangible rewards, and self-dispensed achievement evaluations on children's task mastery. Child Development, 1977, 48, 217-224.

Masters, J. C., & Santrock, J. W. Studies in the self-regulation of behavior: Effects of contingent cognitive and affective events. Developmental Psychology, 1976, 12, 334-348.

Schultz, C. B., & Sherman, R. H. Social class, development, and differences in reinforcer effectiveness. Review of Educational Research, 1976, 46, 25-59.

Switzky, H. N., & Haywood, H. C. Motivational orientation and the relative efficacy of self-monitored and externally imposed reinforcement systems in children. Journal of Personality and Social Psychology, 1974, 30, 360-366.

Thelen, M. H., & Fryrear, J. L. Imitation of self-reward standards by black and white female delinquents. Psychological Reports, 1971, 29, 667-671.

Table 1

Mean Component and Linear Component

Trend Scores for All Experimental Groups

Group	Mean Score	Linear Score
Low-Token	18.030	4.412
High-Token	18.333	2.781
Accel-Token	17.370	2.926
Low-Praise	14.703	1.735
High-Praise	16.181	2.441
Accel-Praise	14.481	1.204
Control	16.111	1.807

FIGURE 1

CHILDREN'S LEARNING AS A F[illegible]CTION OF ACHIEVEMENT STANDARDS AND SE[illegible] REWARD